Globeville Landing Outfall
Environmental Monitoring and Maintenance Plan
for the Vasquez Boulevard/Interstate 70 Site
Operable Unit 2
Denver, Colorado

December 2018

Prepared for:
City and County of Denver
Denver Department of Public Health and Environment
Environmental Quality Division

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I. OVERVIEW

A. Introduction and Scope

This Globeville Landing Outfall Environmental Monitoring and Maintenance Plan ("GLOEMMP") has been prepared for the City and County of Denver ("CCoD") to address the Post-Removal Site Control as outlined in Section 27 of the Administrative Settlement Agreement and Order on Consent for the Removal Action ("AOC"), July 2015, for the Vasquez Boulevard/I-70 Superfund Site ("VB/I-70") Operable Unit 2 ("OU2"). This plan will outline the monitoring and maintenance requirements for the impermeable barrier system installed within the Globeville Landing Outfall ("GLO") open channel segment which prevents contaminated media remaining onsite from adversely impacting storm water conveyed through the channel.

OU2 encompasses approximately 50 acres of the original Omaha & Grant Smelter facility and includes a portion of the Globeville Landing Park ("Park") as shown on the site map. OU2 is generally bounded by I-70 on the north, the South Platte River on the west, Brighton Boulevard on the east, and the southern boundaries include Globeville Landing Park and the Pepsi Bottling Company property. Investigations conducted within and near OU2 found many areas where surface and subsurface soils contained elevated levels of arsenic and lead above what was considered background levels. More details on the OU2 history and site characteristics can be found within EPA's administrative record.

CCoD conducted the GLO open channel storm water project ("GLO Project") for the purpose of upgrading storm water management infrastructure to reduce flooding in the Montclair Drainage Basin area and address storm water management needs. The GLO Project was conducted as a Removal Action under United States Environmental Protection Agency ("EPA") and Colorado Department of Public Health and Environment ("CDPHE") oversight. The environmental components of the GLO Project subject to EPA oversight consisted of: 1) management and handling of waste material encountered during construction of the open channel; 2) management and, if necessary, treatment and/or disposal of dewatering liquid during construction; and 3) design and construction of an impermeable barrier system (i.e., a liner) to prevent any remaining contaminated media from adversely impacting storm water conveyed by the drainage system, as well as prevent storm water infiltration into any remaining contaminated media.

This GLOEMMP sets forth the requirements for long-term maintenance and monitoring of the impermeable barrier system, the piezometers used for monitoring groundwater levels adjacent to the channel, and the sheet pile wall south of the channel. Other non-environmental components are not subject to EPA and CDPHE oversight and are not covered by this GLOEMMP (See Section II.C.2).

B. GLOEMMP Goal

The goal of this GLOEMMP is to define the work tasks, including inspections, maintenance activities and performance validation measures, needed to ensure that the impermeable barrier system continues to prevent contaminated media from adversely impacting storm water conveyed by the drainage system and prevents storm water infiltration into contaminated media remaining within the open channel boundaries. To accomplish this goal, the GLOEMMP will include the following components:

- An inspection and monitoring program to identify damage to the impermeable barrier, open channel structures, and sheet pile wall and/or piezometers;
- A preventative maintenance program to prevent substantial erosion in the channel, ensure vegetation does not impact the impermeable barrier, and to properly maintain the piezometers;
- A performance validation program to include groundwater level monitoring and leak detection testing, when appropriate;
- Controls needed to prevent excavation within the lined channel area and to prevent damage to the sheet pile wall and piezometers; and
- Notification and reporting of inspections and repairs.

II. Roles and Responsibilities

Long-term GLOEMMP activities will be conducted under oversight of the EPA with input from CDPHE, as appropriate.

CCoD shall designate a project manager to implement the tasks as outlined in the GLOEMMP. CCoD shall provide EPA and CDPHE with the project manager's contact information within 5 days of the GLOEMMP approval and will notify EPA and CDPHE within 30 days of any project management changes.

A. GLOEMMP Project Manager

The responsibilities of the GLOEMMP Project Manager are to:

- Implement the GLOEMMP;
- Ensure that systems, processes, and contracts are in place to conduct inspections, evaluate site conditions, identify activities performed by CCoD staff that may trigger training needs, and assist City and other government agencies with securing training, conduct surveys, and ensuring land use controls are upheld, as required by this GLOEMMP;
- Plan for, coordinate, and oversee implementation of any necessary repairs;
- Coordinate as needed with other governmental agencies who may physically disturb the site, such as Metro Wastewater and Urban Drainage and Flood Control District to ensure they are aware of site restrictions and limitations;
- Maintain records, receive and submit all notices, comments, documents, plans, reports, approvals, decisions and other communications to and from EPA and CDPHE on behalf of the CCoD; and
- Ensure that issues pertaining to GLOEMMP are brought to the attention of the CCoD, as appropriate, including requests for ongoing appropriations of needed funds.

B. Other Agencies and Other Agency Personnel

It is expected that the following agencies will periodically access the site for routine work activities:

- Denver's Parks and Recreation Department ("P&R") maintains the Globeville Landing Park. P&R staff may evaluate plant types and the condition of the channel vegetation.
- Denver Wastewater maintains the aprons and outlet structure to occasionally remove sediment and accumulated debris.

- Denver Arts & Venues manages the Denver Coliseum ("Coliseum") venue and maintains the Coliseum parking lot.
- Metro Wastewater Reclamation District ("MWRD") manages and maintains the Delgany sewer interceptors as they cross the Globeville Landing Park area and has an easement to conduct maintenance work on the interceptors.
- The Urban Drainage and Flood Control District ("UDFCD") will be involved in establishing vegetation in the channel bottom and will conduct trash removal, mowing, and repair damages to the channel as requested by Denver Wastewater.

C. Relationship with Other Documents and Plans

1. Final remedy for VB/I-70 OU2

It is anticipated that the VB/I-70 OU2 site will have a final remedy that may require an operations, maintenance, and monitoring ("OM&M") plan. Thus, this GLOEMMP may be superseded by the final remedy OM&M plan, once developed and approved. This GLOEMMP will remain in place until superseded.

2. Non-Environmental Components

Portions of the GLO Project lie within Globeville Landing Park and the Coliseum parking lot. The GLO Project contains components that are non-environmental and not subject to EPA and/or CDPHE oversight. The GLO Project, Globeville Landing Park, and the Coliseum parking lot have ongoing operational and maintenance requirements that are not environmental in nature. Because non-environmental components are not subject to EPA and/or CDPHE oversight, operational and maintenance requirements for those components are not included in this GLOEMMP.

III. Environmental Monitoring and Training Components

A. Purpose

Per the AOC, the Final Design Report (EMSI, 2016) outlined the design requirements for an impermeable barrier system to be placed within the open channel segment of the Globeville Landing Outfall drainage system to prevent any contaminants remaining within the boundaries of the open channel from adversely impacting storm water conveyed by the drainage system, and to prevent storm water infiltration into remaining contaminated media. The impermeable barrier system consists of the following components from below grade to the surface level, which work together to achieve the GLO Project design objectives:

- Stone columns for load distribution and strengthening
- Geogrid and rock aggregate strengthening layer
- Geotextile protective layer
- 60 ml linear low-density polyethylene (LLDPE) geomembrane (i.e., liner)
- Geonet composite protective layer
- Lower planting soil layer
- Highly visible barrier grid (i.e., orange construction fence)
- Surface planting soil layer

- Native grass vegetation

Noted exception: At the Arkins outlet to the GLO channel, the barrier grid does not exist under the grouted boulders which extend 26 feet into the channel. The remaining open channel area contains the barrier grid as shown in the Construction Completion Report Record Drawings.

The liner edge is bolted to the concrete retaining walls within the boundary of the open channel. The areas beyond the open channel walls are covered with asphalt pavement within the Coliseum parking lot area and with vegetated areas, concrete trails, and concrete plazas in the Globeville Landing Park. Additional detail on the engineering design can be found in the Removal Action Work Plan and Final Design Report, found in EPA's administrative record.

B. Indicators of Concern

Indicators of potential concern for the GLO impermeable barrier system that would trigger further investigation and/or consultation with the liner expert include:

- Excessive settlement of lined areas, as evidenced by visual observation of sink-holes, areas of standing water, pulling away of the liner from the retaining walls, etc.;
- Excessive settlement or differential movement of concrete greater than two inches, and cracking or crumbling of the retaining walls;
- Presence of deep-rooted vegetation within the lined areas;
- Exposure of the highly visible barrier grid through erosion or excavation;
- Groundwater level measurements that exceed the allowable elevation factor of safety for buoyancy force; and
- Damage to the sheet pile wall on the south side of the channel which extends from 2 feet to approximately 20 feet below ground surface. See Appendix A, Sheet Pile Wall Figure.

C. Environmental Monitoring and Training Activities

Environmental monitoring and training activities will include visual inspections, land surveys, assessment of vegetation, groundwater elevation monitoring, and training.

The frequency, responsibilities, and reporting of these activities are included in Table A.

Table A: Environmental Monitoring and Training Activities

GLOEMMP Activity	Minimum Frequency	Responsible Entity	Look For	Action Taken	Documentation
Visual Inspection.	Quarterly until the Coliseum outlet is fully operational, annually thereafter, and after a 10-year or greater flood event.	GLOEMMP Project Manager.	Cracks in retaining walls, signs of slope failure, rodent holes, seepage or ponding, erosion damage and/or exposure of the orange construction fencing, excessive or uneven settlement, and damage to the piezometers or area where the sheet pile wall is located (Appendix A).	Document conditions. Repair damage. Report significant events. Consult liner expert if significant damage is visible.	Visual Inspection Form, photographs.
Land Survey.	Operational completion, then one year following project completion, then every five years adjusted to provide information for EPA's OU2 five-year review cycle.	GLOEMMP Project Manager coordinates.	Excessive or uneven settlement of concrete retaining walls. The field log will include a notation regarding the condition of the surveyor markings on the GLO channel walls and whether the survey locations need to be remarked.	Document conditions. Report significant events. Consult liner expert if significant settlement is great than 2 inches.	Operational completion as-built elevations compared to future year elevations at established channel wall locations.
Vegetation Survey.	Annually.	P&R representative, GLOEMMP Project Manager coordinates.	Deep-rooted species. Changes in vegetation.	Document conditions. Remove deep-rooted species.	Summary of inspection from P&R, photographs.

GLOEMMP Activity	Minimum Frequency	Responsible Entity	Look For	Action Taken	Documentation
Ground-water elevation monitoring.	Quarterly for 2 years following project completion and annually thereafter during the wet season (May through July).	GLOEMMP Project Manager coordinates.	Groundwater elevations compared to corresponding liner elevations. Maximum groundwater rise above the liner elevation should not exceed 3.8 feet. Notification level is 3.3 feet above liner elevation. Any noted ambient odors coming from the well, will be noted in the field log.	Document conditions. Notify EPA, as appropriate. Confirm groundwater elevations when an elevation level of 3.3 feet above the liner is reached. Consult liner expert following confirmation should groundwater elevations remain at or above 3.3 feet.	Groundwater elevation reporting.
Training.	Annually.	DDPHE Training Manager, CCoD staff	Ensure training is developed and made available.	Training modules. Document training.	Training completion forms kept on file.
Agency coordination.	Annually.	GLOEMMP Project Manager coordinates with Metro Wastewater, Urban Drainage & Flood Control District, Wastewater, P&R, Arts & Venues to determine annual work plans.	Agencies which may disturb soil in GLO Project area within OU2.	Documentation of contacts made.	Annual contact log kept on file.

1. Visual inspections

The GLO Project area will be visually inspected for damage quarterly until the Coliseum outlet within the GLO channel is fully operational. The Coliseum outlet will be fully operational when the 39th Avenue Greenway stormwater infrastructure project, which ties into Coliseum outlet, is completed in the spring of 2019. The GLO Project area will be inspected for damage annually, when the channel is fully operational, and within five days after a 10-year or greater flood event.

Per the GLO channel design, a 10-year flood event was defined as a flow rate of 1,740 cubic feet per second or a rainfall depth of 1.55 inches occurring over a one-hour period. The rainfall depth was determined using the 1973 National Oceanic and Atmospheric Administration ("NOAA") standard one-hour rainfall depth for Denver for a 10-year flood. The flow rate was determined using the EPA Stormwater Management Model that calculates rainfall runoff and routes the resulting flow hydrographs through the drainage system. In 2013, the new NOAA Atlas 14 - Precipitation-Frequency Atlas of the United States, Volume 8-Midwestern States was published with new precipitation values. UDFCD provided a peer review of NOAA's work. In 2016, UDFCD used NOAA Atlas 14 values in a Colorado Urban Hydrograph Procedure recalibration effort and decided to adopt the new values at that time. The revised NOAA standard one-hour rainfall depth for Denver is 1.35 inches for a 10-year flood and was published in the UDFCD Urban Storm Drainage Criteria Manual (March 2017). There is a rainfall gage located upstream of the project site within the Denver Zoo that is included in the CCoD's flood safety warning program. The Project Manager will get an email notification when the Denver Zoo rain gage reaches a rainfall depth of 1 inch over a one-hour period. Within five days of the notification, the Project Manager will perform a visual inspection of the GLO channel to confirm the liner integrity and verify whether water filled to the elevation of the overflow spillway per the channel design for a 10-year flood event. The rain gage notification level will be adjusted over time per the visual observation of water depth at the overflow spillway and the actual Denver Zoo rainfall gage depth during the storm event to ensure an inspection occurs after a 10-year or greater flood event. The notification level shall always be less than or equal to the current UDFCD's Urban Storm Drainage Criteria Manual's 10-year flood precipitation frequency estimate over a one-hour period.

Inspections will be conducted by the Project Manager, or a designee. The Project Manager will notify EPA and CDPHE at least 10 working days prior to the quarterly or annual inspection to allow EPA/CDPHE representatives to accompany the inspection, if desired. The Project Manager or designee will document observations by completing the visual inspection form included in Section IX and photograph pertinent observations. Each inspection will include a general evaluation as to whether the impermeable barrier system of the GLO Project is performing its intended function. Inspection forms will be submitted in the annual GLOEMMP Report. If the inspection indicates that there is a risk to the effectiveness of the impermeable barrier system, then EPA and CDPHE will be notified, and the liner expert will be consulted for advice.

The visual inspections will consist of a walking survey of the entire lined area, including the concrete retaining walls, apron areas, the grouted boulder area, vegetated area, the storm sewer outfalls into the channel, and the outlet structure. The lined area will be inspected for signs of damage, failure, or disturbance, including cracks or settlement in retaining walls, slope failure, liner pull away from walls, rodent holes, seepage or ponding, erosion damage, exposure of visible barrier grid (i.e., orange

construction fence) or liner, and excessive or uneven settlement. The inspection will also include an evaluation of potential damage to the piezometers and/or sheet pile wall.

2. Land survey

A baseline land survey will be conducted within three months of operational completion which will establish locations and as-built elevations on concrete retaining walls surrounding the liner. A local benchmark(s) will be established to facilitate future surveys. The concrete retaining walls will be surveyed one year following project completion, and every five years thereafter, adjusted to align with EPA's five-year review cycle. If a settlement of two inches or greater is measured compared to the baseline as-built wall elevations, EPA will be notified, and the liner expert will be consulted for advice. All surveys will be completed under the direction of a Colorado-certified land surveyor. Surveyor documentation, including photographs if appropriate, will be submitted in the GLOEMMP Report.

3. Vegetation survey

The GLOEMMP Project Manager will coordinate with P&R to ensure that a vegetation survey is conducted on an annual basis. P&R will survey the vegetation on top of the liner to evaluate whether deep-root plants are present that could penetrate the liner. Planting of trees or other deep-rooted species is prohibited within the liner area. Should deep-rooted species be identified, these species will be removed and appropriate vegetation established. If it appears that the roots of the deep-rooted species are long enough to have reached the liner, the Project Manager will perform further inspection and, when potential damage is observed, consult with the liner expert. Permanent below-ground irrigation improvements are also prohibited. The vegetation survey documentation will be submitted in the annual GLOEMMP Report.

4. Groundwater elevation monitoring

The GLO design includes an objective to prevent buoyancy of the impermeable barrier system through maintaining a factor of safety ("FOS") of sufficient magnitude with regards to groundwater elevations relative to the base of the liner. The selected FOS considers the potential for buoyancy of the impermeable barrier system from upward hydraulic pressure caused by groundwater levels beneath the liner, while considering the weight of overlying materials above the liner. Specifically, the liner design included a FOS of 150% as the lower limit. This FOS translates to an allowance of up to approximately 3.8 feet of positive hydraulic head (upward pressure) beneath the base of the liner. A positive head of less than 3.8 feet would be acceptable, whereas a positive head greater than 3.8 feet would not.

CCoD will notify EPA when performance validation piezometer measurements indicate groundwater elevations are within or greater than 0.5 feet of the 150% FOS elevations for their corresponding liner elevations. A measurement of 3.3 feet or greater positive hydraulic head above the corresponding liner elevation would trigger EPA notification and confirmation monitoring of groundwater elevations.

Within three months of operational completion, CCoD will install a piezometer network to observe groundwater elevations in proximity to the open channel segment of the GLO Project. Proposed monitoring locations will be submitted to EPA for review prior to installation. Piezometers will be monitored quarterly for the first two years following project completion and annually thereafter during the wet season (May through July). A piezometer location map, construction logs, groundwater

elevation results, and corresponding liner elevations will be provided in the first annual GLOEMMP Report.

D. Land Use Restrictions and Training

The GLOEMMP Project Manager will establish appropriate land use restrictions and management practices to limit excavation within the lined area and prevent damage to the sheet pile wall and piezometers.

CCoD will implement the following land use restrictions and maintenance practices for its maintenance crews that work regularly on city-owned properties on tasks that require digging. These processes include:

- CCoD Land Use Restrictions: CCoD will implement land use restrictions within Globeville Landing Park related to the following engineered components of the removal action: the liner within the open stormwater channel, the sheet pile wall south of the open channel wall, and three piezometers between the sheet pile wall and the southern open channel wall.

  Activities that may damage the liner within the Globeville Landing Park open storm-water channel and/or the sheet pile wall and piezometer area, as depicted in Appendix B, are prohibited. Within the liner area, such activities include, but are not limited to excavation, drilling, grading, digging, tilling and any other soil-disturbing activities extending greater than 18 inches below the ground surface, construction of any sort, placing of any structures on the geomembrane barrier system, and vehicular traffic. Within the sheet pile wall and piezometer area, such activities include, but are not limited to, drilling, grading, and excavation within a foot of the sheet pile wall or piezometers. Land use restrictions shall not limit the use of equipment and vehicles needed to perform any authorized maintenance or repairs to the liner, channel structures, piezometers, or sheet pile wall.

- CCoD GIS mapping system: CCoD maintains a GIS mapping system which contains a layer identifying properties with land use control designations. The geographic extent of the lined area and the sheet pile wall and piezometer area will be placed within the GIS mapping layer identifying the land use restrictions.

- Construction and Access Permits: A Construction and Access Permit issued through Denver P&R will be required prior to conducting any activity that will impact Denver Parks and Recreation facilities, including parks, parkways, and trails. Additional information on these permits can be found at CCoD's Parks and Recreation website.

- City-wide Management Plan for regulated asbestos-containing soils: CCoD has put in place an "Asbestos-Contaminated Soil Management Standard Operating Procedure for the City and County of Denver", dated December 2010, which will be updated as necessary. This Standard Operating Procedure ("SOP") governs management of asbestos-contaminated soils on properties owned by CCoD, including the GLO Project. All deviations from this SOP receive prior approval from the CDPHE prior to implementation.

These processes will be used to ensure that prohibitions on any activities which could damage the liner, the sheet pile wall, or piezometers, are enforced. The GLO Project area, including the lined area, will be recorded within the City's GIS mapping system, which identifies areas where special restrictions apply. Notifications will be placed within this system alerting users to the land use restrictions. Additionally, the Project Manager will verify that the processes are in place, the use restricted areas are mapped within the City's GIS mapping system, and the appropriate maintenance groups are being trained regarding the land use restrictions.

E. Environmental Training

CCoD provides training on a variety of environmental topics to City agencies and departments. The trainings normally are customized to each department's operations and include storm water management, hazardous waste management, asbestos in soils and in the built environment, spill prevention, and EMS. Environmental training is made available to City agencies likely to conduct work activities in the GLO Project area, including staff members from Public Works, P&R, and General Services. The training modules routinely include key messages regarding checks and notifications needed before digging in city rights-of-way and parks. CCoD will incorporate messages regarding the land use restrictions and proper notification for planned excavation in areas that may contain asbestos in soils into scheduled trainings for the appropriate staff. Appropriate work groups and the necessary messages are included in Table B.

Table B: Training

Work Group	Key Messages	Frequency	Documentation
Wastewater Maintenance Crews.	Review process requirements. RACS training. Land Use Restrictions. No heavy equipment allowed. Report settlement, erosion, problems.	Annually.	Training log and training materials kept on file.
P&R: Parks District, Forestry, Maintenance Crews.	Review process requirements. RACS training. Land Use Restrictions. No deep-root plants allowed. Report settlement, erosion, problems.	Annually.	Training log and training materials kept on file.
Arts & Venues Maintenance Crews.	Review process requirements. RACS training. Land Use Restrictions. Report settlement, erosion, problems.	Annually.	Training log and training materials kept on file.
General Services.	Review process requirements. RACS training. Land Use Restrictions.	Annually.	Training log and training materials kept on file.

	Report settlement, erosion, problems.		

IV. Preventative Maintenance

The GLO Project area will be maintained in a manner that ensures its intended function to convey storm water within the open channel, prevents any contaminants remaining within the boundaries of the channel from adversely impacting storm water conveyed by the drainage system, and inhibits storm water infiltration into remaining contaminated media. The piezometer network shall also be maintained for groundwater level monitoring.

A. Routine and Minor Maintenance

Minor maintenance activities will occur as they are identified. The Project Manager is responsible for follow-up review to ensure that identified repairs are completed on schedule. Minor maintenance activities will not be reported to EPA. Examples of minor maintenance or repair include sealing cracks, repairing minor erosion damage that does not expose the visible barrier grid or where there was minor soil loss below the grid, revegetating bare areas, removing undesirable vegetation, and conducting routine sediment and trash removal.

B. Damage and Significant Events

Immediate and appropriate action will be taken to evaluate, minimize and/or repair any occurrence which the Project Manager believes may have compromised the integrity of the liner system. The need for action will be identified via regular inspections, surveys, a report of damage observed by persons at the site, or by inspecting the open channel surface soils after a significant event that has the potential to impact the liner integrity. Upon receipt of a report of damage or a significant event, the Project Manager will visually inspect the area to determine if significant disturbances have occurred, and record findings using the Visual Inspection Form. More significant disturbances would include excessive settlement of the open channel structure, damage to the sheet pile wall, erosion that exposes and/or damages the visible barrier grid with excessive soil loss below the grid, erosion that exposes the liner, or significant cracks in concrete retaining walls. If a significant disturbance has occurred, the Project Manager will notify EPA and CDPHE of these conditions within five days of discovery and will consult with appropriate technical experts. The Project Manager will take appropriate action in consultation with EPA, CDPHE, and appropriate technical experts.

C. Electrical Leak Location Surveys

If, following an inspection, the liner expert believes that the integrity of the liner system may have been compromised and recommends an Electrical Leak Location Survey ("ELLS"), an ELLS will be conducted per ASTM D7007, Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earthen Materials. EPA and CDPHE will be contacted a minimum of ten days prior to commencement of the ELLS to allow observation, if desired. Based upon the results of the ELLS, appropriate repairs will be conducted. Results of ELLS will be submitted to EPA within 30 days of ELLS completion.

D. Major Repairs

Any major repair of the lined area or sheet pile wall will require a work plan. Any work requiring excavation at depths where municipal landfill materials may be encountered will require a project-specific Materials Management Plan. See the exhibit in Appendix C showing the Regulated Asbestos Containing Coils (RACS) Limits as of October 10, 2018. The work will be performed only after review and approval by EPA and CDPHE. A major repair of the liner is defined as a leak identified by an ELLS that triggers a liner repair. Such a repair may involve excavation to expose the liner (about 3 to 4.5 feet below grade), excavation below the visible barrier grid material if exposed, or a significant channel maintenance activity such as repairing substantial erosion damage. Any such repair will need to be directed by the liner design engineer and/or certified liner repair expert. A major repair of the sheet pile wall may include excavation and replacement of damaged sections of the sheet pile wall.

A Work Completion Report describing the events that occurred, response measures, and liner integrity verification will be submitted to EPA and CDPHE within 45 days of any major repair. The Work Completion Report will include a description of the work performed, dates, work location, work activities, any variances from approved work plan, and a summary of finished site conditions.

V. Notifications and Reporting

A. Notifications

Notifications to the oversight agencies will occur as follows:

Table C: Notifications and Reporting

GLOEMMP Activity	Notification to:	Timeframe	Form
Visual inspection	EPA/CDPHE	10 days prior	Verbal or e-mail
Significant events or damage	EPA/CDPHE	Within 5 days of discovery	Written notification
ELLS planned	EPA/CDPHE	10 days prior	Written notification prior; Findings within 30 days
Major repairs	EPA/CDPHE	As approved	Written work plan with schedule prior to repair; Work completion report as approved
Annual Report	EPA/CDPHE	Within 45 days of calendar year end	Report

B. Reporting

An annual GLOEMMP Report will summarize the findings of the monitoring program and will document significant events which impact the integrity of the impermeable barrier system, sheet pile wall, and/or piezometers and any repairs. The report will include completed forms, photo documentation, and records. The summary report will be submitted to EPA and CDPHE within 45 days of the end of the annual (calendar year) reporting period, i.e. by February 15 of the following year. Records will be

maintained by the Project Manager to support annual reporting requirements and will be kept permanently per the CCoD General Records Retention Schedule. The annual report will include the following components:

- A summary of and results of annual inspections, maintenance performed, and any significant events;
- Visual inspection forms and photo documentation (scheduled and unscheduled);
- Land survey records;
- Vegetation surveys and photo documentation;
- A groundwater level measurement summary and records;
- Any ELLS documentation and photo documentation, as needed;
- Summary of any major repairs;
- Summary of any significant changes in site conditions and usage;
- Description of and schedule for any anticipated maintenance work to be completed in the open channel or in the area of the sheet pile wall and piezometers for the next year;
- Documentation of additional investigation, monitoring, and/or mitigation required by the regulatory agencies; and
- Conclusions regarding the on-going effectiveness of the liner system.

VI. Modification of GLOEMMP

When long-term performance of the environmental components of the GLO Project has been confirmed, the Project Manager may apply to EPA to modify the requirements of the GLOEMMP Plan based on site-specific monitoring results and conditions.

VII. References

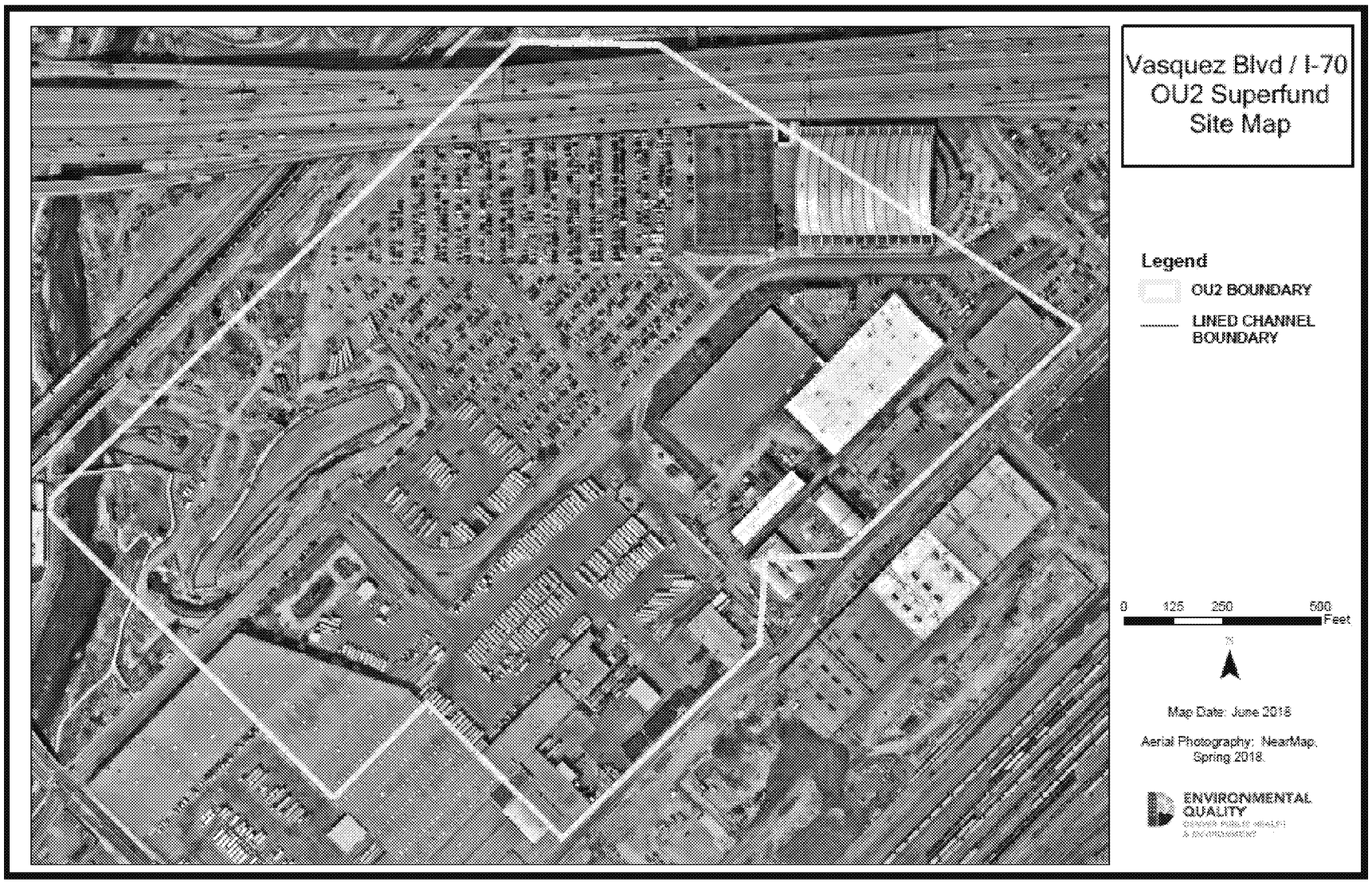
A. Administrative Settlement Agreement and Order on Consent (AOC) for Removal Action in a Proceeding Under Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622 regarding the Vasquez Boulevard/Interstate 70 (VB/I70) Site Operable Unit 2 (OU2), July 1, 2015.

B. EMSI, Removal Action Work Plan, High Street Outfall and 40th Avenue Storm Sewer System, Vasquez Boulevard/Interstate 70 Site, Operable Unit #2, June 19, 2015.

C. EMSI, Final Design Report, Environmental Components for Globeville Landing Outfall Project, Vasquez Boulevard/Interstate 70 Site, Operable Unit #2, February 5, 2016.

D. Denver Department of Environmental Health, Asbestos-Contaminated Soil Management Standard Operating Procedure for City and County of Denver", December 2010.

VIII. Site Map



IX. Visual Inspection Form - Globeville Landing Outfall

General Information

Inspector Name: _____ Title: _____

Date of Inspection: _____Time: _____

Weather Conditions (temperature, wind, precipitation, etc): _____

_____

Condition of Site:

Lined area condition (indicate areas inspected, any ponding, exposure of visible barrier grid, settlement, rodent holes, etc):_____

_____

Any erosion observed (describe extent, depth and indicate locations of any eroded areas on map): ____

_____

_____

Condition of vegetation (describe vegetation types, any deep-rooted species, vegetated coverage, etc.):

_____

_____

Retaining wall condition (indicate if cracks, settling, movement, liner pull-away, etc.): _____

_____

Condition of apron areas, outlet structure, piezometers, and sheet pile wall area:

_____

_____

_____

Other notes: _____

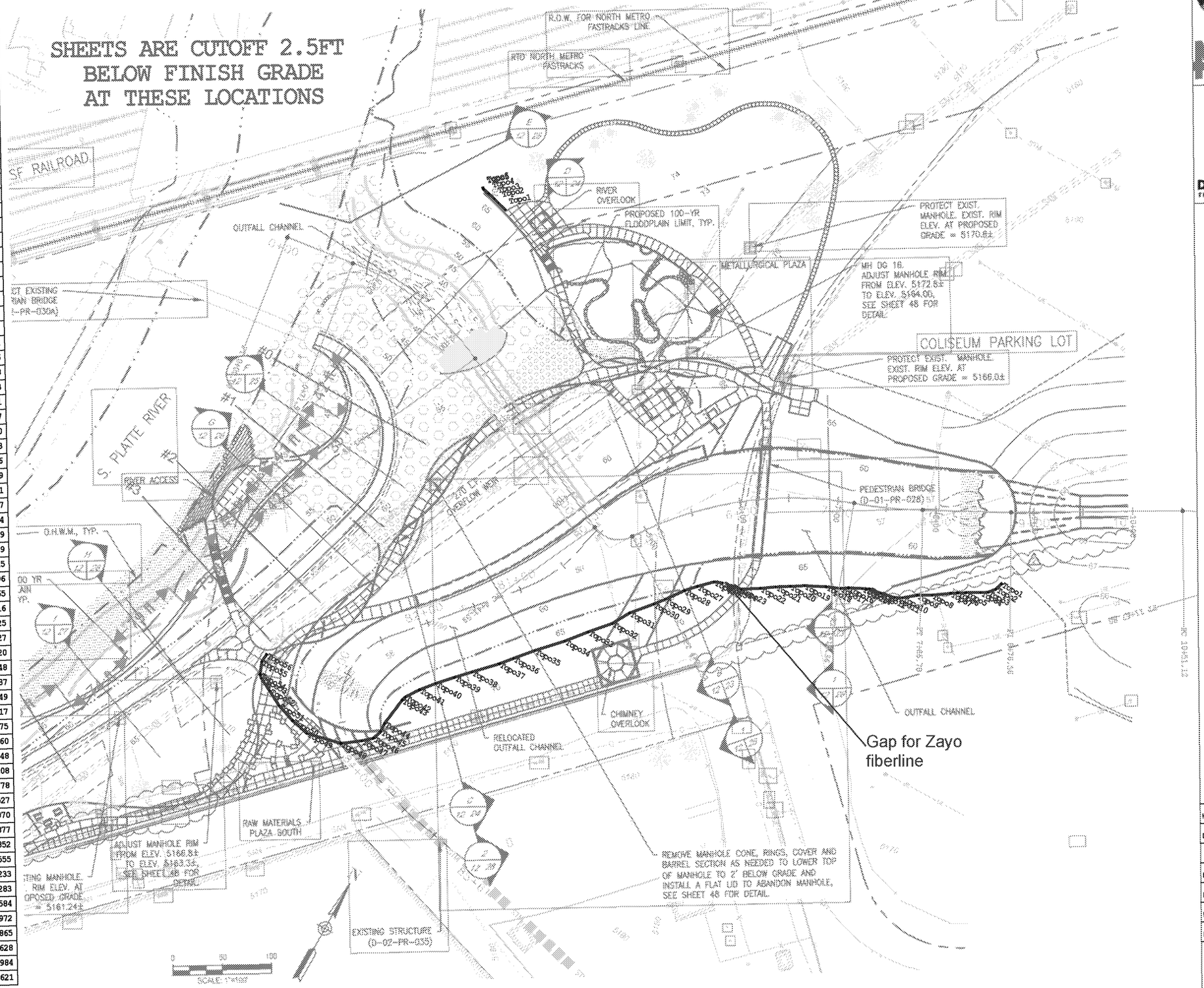
_____

Appendix A

Sheet Pile Wall Figure

As-Built Sheet Pile		
Name	Northing	Easting
Topo1	408107.230	578406.866
Topo1	408197.164	577781.549
Topo2	408099.957	578404.473
Topo2	408199.847	577772.006
Topo3	408093.288	578399.034
Topo3	408201.533	577766.251
Topo4	408089.305	578392.626
Topo4	408203.395	577758.799
Topo5	408081.901	578379.273
Topo5	408204.812	577751.943
Topo6	408205.709	577751.049
Topo6	408077.791	578372.155
Topo7	408073.754	578366.002
Topo8	408063.110	578350.208
Topo9	408055.695	578337.113
Topo10	408046.249	578325.325
Topo11	408042.586	578318.058
Topo12	408039.725	578303.702
Topo13	408037.995	578291.541
Topo14	408036.164	578288.686
Topo15	408034.917	578284.998
Topo16	408028.714	578272.373
Topo17	408024.242	578265.461
Topo18	408018.700	578251.967
Topo19	408009.070	578232.130
Topo20	408001.487	578219.743
Topo21	407993.990	578207.216
Topo22	407985.077	578194.189
Topo23	407974.906	578177.231
Topo24	407973.483	578167.117
Topo25	407971.255	578157.684
Topo26	407968.272	578149.869
Topo27	407955.976	578137.049
Topo28	407945.961	578127.715
Topo29	407928.399	578114.596
Topo30	407918.601	578106.665
Topo31	407899.090	578089.716
Topo32	407881.293	578079.425
Topo33	407861.944	578062.127
Topo34	407842.249	578045.720
Topo35	407819.311	578023.748
Topo36	407801.797	578008.537
Topo37	407789.961	577998.549
Topo38	407769.204	577978.117
Topo39	407756.103	577965.375
Topo40	407741.449	577951.660
Topo41	407727.800	577940.148
Topo42	407714.441	577931.108
Topo43	407709.876	577929.778
Topo44	407680.669	577925.527
Topo45	407671.557	577926.070
Topo46	407662.087	577922.877
Topo47	407654.141	577913.852
Topo48	407641.575	577896.555
Topo49	407633.815	577861.233
Topo50	407638.090	577842.283
Topo51	407644.943	577822.584
Topo52	407653.611	577806.972
Topo53	407660.360	577793.865
Topo54	407663.386	577790.628
Topo55	407675.407	577785.984
Topo56	407683.979	577786.621

SHEETS ARE CUTOFF 2.5FT BELOW FINISH GRADE AT THESE LOCATIONS



Kiewit

Ames Construction, Inc.

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GLOBEVILLE LANDING OUTFALL PROJECT PHASE 1A

SHEET PILE AS-BUILT PLAN

Hz Scale: 1 : 100	Vt Scale: 1
Drawn By: A. GOTHARD	Chkd By:

Revision History

Revision	0	10/12/2018	AAG
Revision			
Revision			
Revision			

REF 01

Appendix B

Globeville Landing Outfall Land Use Restriction Areas

Globeville Landing Outfall Land Use Restriction Areas Appendix B

ARKINS

Legend

- OU- 2 BOUNDARY
- LINED CHANNEL BOUNDARY
- LINER
- SHEET PILE WALL
- AREA OF SHEET PILE WALL AND PIEZOMETERS
- PIEZOMETERS

0 250 500 1,000 Feet

N

Map Updated: NOV 2018

Aerial Photography: NearMap, Spring 2018.

ENVIRONMENTAL QUALITY
DENVER PUBLIC HEALTH & ENVIRONMENT

Appendix C

Globeville Landing Outfall RACS Limits Exhibit

RACS Limits Exhibit as of 10/18/18

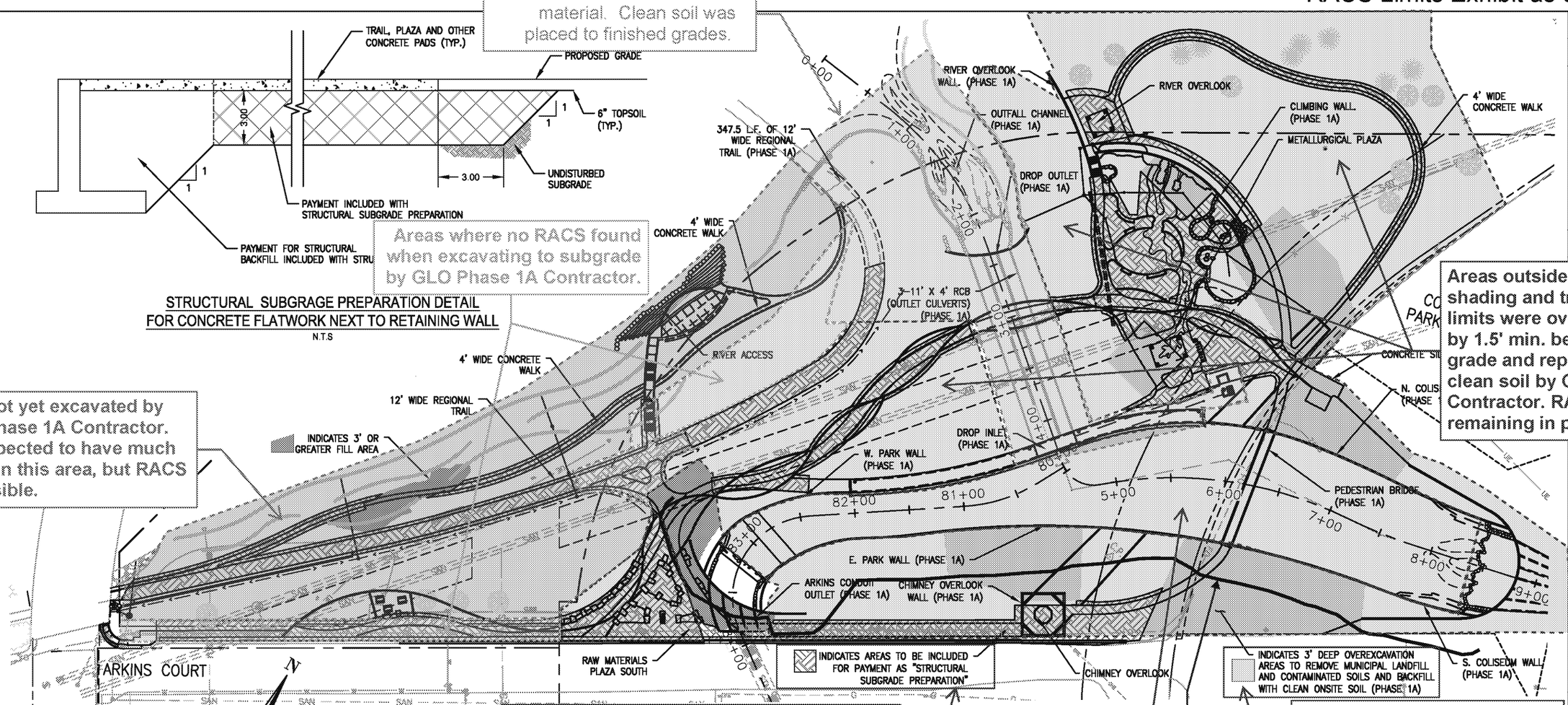
Area excavated below landfill material. Clean soil was placed to finished grades.

STRUCTURAL SUBGRADE PREPARATION DETAIL
FOR CONCRETE FLATWORK NEXT TO RETAINING WALL
N.T.S

Areas where no RACS found when excavating to subgrade by GLO Phase 1A Contractor.

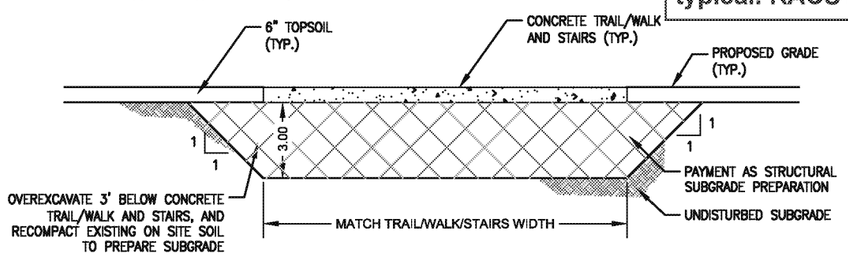
Areas outside of gray shading and tree protection limits were overexcavated by 1.5' min. below finished grade and replaced with clean soil by GLO Phase 1A Contractor. RACS left remaining in place.

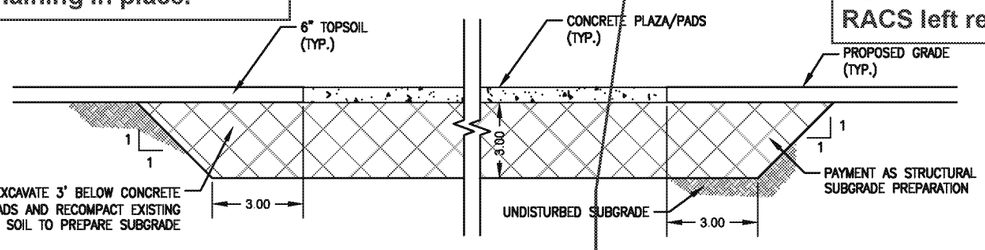
Area not yet excavated by GLO Phase 1A Contractor. Not expected to have much RACS in this area, but RACS is possible.



Subgrade preparation areas overexcavated by 3.5' below finished grade and replaced with clean soil by GLO Phase 1A Contractor, typical. RACS left remaining in place.

Areas overexcavated by 3' below finished grade and replaced with clean soil by GLO Phase 1A Contractor. RACS left remaining in place.





STRUCTURAL SUBGRADE PREPARATION DETAILS
N.T.S

Area excavated by GLO Phase 1A Contractor. RACS left remaining in place. Below main channel, RACS is 1' minimum below the liner.

NO.	DESCRIPTION OF REVISIONS	DATE	BY

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DENVER THE MILE HIGH CITY

GLOBEVILLE LANDING OUTFALL
PROJECT - PHASE 1B

MASTER PROJECT NO: 2016-PROJMSTR-0000577

STRUCTURAL SUBGRADE PREPARATION PLAN

DRAWN BY:	JJ, WS
DESIGNED BY:	JB
APPROVED BY:	MRG
DRAWING NAME:	8594-GR
DATE:	June 29, 2018
SHEET NO.:	23 OF 128

Q:\DEN\Projects\8594-00 40th Street Outfall\Design\CDs\Globeville\Phase 1B Rebid\PH1B DWGs\FromPH1A\8594-Over-e... 10/17/2018 3:49 PM dwg